

## **IOWA HIGHWAY RESEARCH BOARD (IHRB)**

*Minutes of April 27, 2012*

### **Regular Board Members Present**

A. Abu-Hawash  
J. Berger  
V. Dumdei  
R. Knoche  
J. May

E. Steffensmeier  
R. Younie  
K. Mayberry  
J. Moellering  
W. Weiss

### **Alternate Board Members Present**

W. Klaiber for T. J. Wipf

R. Fangmann for C. Schloz

### **Secretary - M. Dunn**

### **Members with No Representation**

R. Kieffer  
J. D. King

D. Schnoebelen

### **Visitors**

Vanessa Goetz  
Lori Pflughaupt  
Nicole Fox  
Scott Neubauer  
Linda Narigon  
Brent Phares  
Jeramy Ashlock  
Jennifer Shane  
Pete Taylor  
Brian Keierleber  
Lisa Rold  
George Constantinescu  
Marian Muste  
Daron Brown

Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa State University  
Iowa State University  
Iowa State University  
Iowa State University , CP Tech  
Buchanan County  
FHWA Iowa Division  
University of Iowa  
University of Iowa  
Buildex, Inc.

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Thursday, April 27, 2012. The meeting was called to order at 9:00 a.m. by Chairperson Ron Knoche with an initial number of 11 voting members/alternates at the table.

### **Agenda**

No changes were made to the Agenda.

**Motion to approve Minutes from the February 2012 meeting** by R. Younie. 2<sup>nd</sup> by K, Mayberry.  
Motion carried with 11 Aye, 0 Nay, 0 Abstaining.

## **BACKGROUND**

Previous research on construction work-zone safety found that moving operations represent the highest-risk activity when both frequency of occurrence and severity of loss are considered (Shane et al. 2009). The research further determined that using an integrated risk model that assesses risk over the project life cycle could mitigate the risk of moving operations (among others) during the construction phase. Although designed specifically to examine risk and safety for work-zone applications, the research indicated that construction activities that involve moving operations (e.g., painting, guardrail placement) represented the highest risk. This finding suggests that the risk-modeling process could be applied beneficially to operations and maintenance (O/M) functions outside of static construction work-zone applications.

Hence, this research examines how an integrated risk-modeling approach could be used to reduce the frequency and intensity of loss events (property damage, personal injury, fatality) during highway O/M activities.

## **OBJECTIVES**

The objective of this research is to investigate the application of integrated risk modeling to O/M activities, specifically moving operations such as pavement and structures testing, pavement marking, painting, shoulder work, mowing, and so forth.

The ultimate goal is to reduce frequency and severity of loss events (property damage, personal injury, and fatality) during O/M activities. Potential risk factors to explore included the following issues:

- Traffic level/congestion
- Number of roadway lanes
- Posted speed limit
- Inadequate/improper signage
- Inadequate/improper vehicle lighting and marking
- Insufficient worker training
- Proximity of obstructions (equipment) to traveled roadway
- Physical limitations of crash attenuators
- Limitations of equipment due to the specialized nature of the fleet
- Weather (condition of road surface, visibility, etc.)
- Work under traffic (inadequate separation or lack of detours/lane shifts)

**Motion to Approve** by V. Dumdei. 2<sup>nd</sup> by B. Younie.

Motion carried with 11 Aye, 0 Nay, 0 Abstaining.

\*\*\*One new member joined the table: Now 12 voting members\*\*\*

**PROPOSAL *Methods for Removing Concrete Decks from Bridge Girders*, Brent Phares, Iowa State University/InTrans (\$143,391)**

**BACKGROUND**

With ever tightening budgets, states are looking for cost-effective methods of extending the duration from initial bridge construction to complete replacement. One common technique that serves this purpose is to replace the deck after the end of its useful service life has been reached while keeping the original superstructure and substructure. That is, assuming that the superstructure and substructure still have adequate strength and remaining life. For this approach to be successfully accomplished, it is critical that the deck is removed without damaging the superstructure elements.

**OBJECTIVES**

The objective of this work is to determine the most, and/or develop new, cost-effective and efficient deck removal techniques for steel and prestressed concrete superstructure bridges. Further, the work proposed herein will include guidance on assessing and repairing steel girders that are damaged during removal of a deck. The following criteria will be considered as part of the evaluation: Impact on the future performance of the superstructure, Cost, Time, Safety, and Noise.

The Iowa DOT Office of Bridges and Structures was contacted by the University of Nebraska via a survey request. Due to project similarities, it was decided to collaborate. The Iowa DOT/ISU primary focus will be on steel girder bridges, the NDOR/UN primary focus will be on P/S concrete girders. A total of three funding sources being leveraged:

- IHRB
- NDOR
- Mid-America Transportation Center (MATC)

**Discussion**

Q: If the University of Nebraska is unable to get this funding through the Nebraska Dept of Roads, is the project stopped? Is it all reliant on each other?

A: Yes and No. NDOR has already committed a certain level of funding with a commitment to add additional funding in the future. The only uncertainty is with MATC. If that funding is not obtained, then we will come back to discuss a possible re-scope of the project.

**Motion to Approve** by R.Fangman. 2<sup>nd</sup> by E. Steffensmeier.  
Motion carried with 11 Aye, 0 Nay, 1 Abstaining (W. Klaiber).

**PROPOSAL *Evaluation and Testing of a Light-Weight Fine Aggregate Concrete Bridge Deck*, Peter Taylor, Iowa State University/InTrans (\$83,049) \*\*Presented by Brian Keierleber, Buchanan County Engineer**

**BACKGROUND**

Recent research has indicated that there are several benefits to using light-weight aggregate (LWA) in concrete mixtures for use in concrete bridge decks. The LWA particles act as reservoirs that provide

curing water to the hydrating mixture from within the system. This is particularly beneficial in low water to cement (w/cm) ratio concrete mix designs in which it is likely that there will be insufficient water to hydrate all of cement at the time of the mixing. This improves the properties of the concrete and reduces the risk of cracking.

In order to ensure that these concrete material alternatives offer the greatest benefit to bridge owners, both in Iowa and nationwide, the proposed research consists of field testing and evaluating a demonstration bridge designed to utilize a LWA concrete mixture in the concrete deck of a composite steel girder bridge system. The research proposed herein will be performed through a cooperative effort of researchers at Iowa State University (ISU), the Iowa Department of Transportation and Buchanan County Engineering staff.

## **OBJECTIVES**

The objectives of this project are to:

Perform laboratory and field testing and evaluation of a concrete bridge deck constructed with LWA concrete. The CP Tech Center will conduct material tests on the LWA and concrete mixtures used in the bridge deck, both in the lab and during construction. In addition, the Bridge Engineering Center (BEC) will conduct live load field tests to evaluate the performance and condition of the LWA deck and the control deck both at the time of placement and approximately 1 year after construction. Evaluation of performance will be made through comparisons with design assumptions, previous research, and the performance of the LWA deck compared to the control.

**Motion to Approve** by W. Weiss. 2<sup>nd</sup> by K. Mayberry.  
Motion carried with 11 Aye, 0 Nay, 1 Abstaining (W. Klaiber).

## **PROPOSAL *Additional Funding for TR-626 Optimization of Snow Drifting Mitigation and Control Methods for Iowa Conditions, George Constantinescu, University of Iowa/IIHR (additional \$214,826)***

This proposal is a request for additional funding for the project. The last winter over which data was collected as part of Part I of the present study was characterized by a lack of major snow storms. As a result, a full assessment of the efficiency of using lower porosity snow fences compared to the classical design employing fences with a porosity of 50% was not possible.

## **BACKGROUND**

One common problem in Iowa is that the right of way on which the fences can be installed is at many critical locations too narrow to allow the snow fence to be installed at the recommended distance from the edge of the roadway, such that the snow fence will work efficiently. To reduce the amount of rental fees and labor to install and remove temporary fencing on private property, there is a need to investigate snow fence alternatives that can be installed within right of ways that are considered too narrow for traditional methods.

## **OBJECTIVES**

The goal of this project is to optimize the design of passive snow-control measures for Iowa roadways such that the impact of drifting on the roads is minimized or eliminated. The main goal of the proposed

study will be on providing optimized solutions for the design of structural snowfences (the focus will be on lightweight plastic fences that are widely utilized in Iowa) and living snow fences (the focus will be on standing corn and living trees or shrubs that are common types of vegetation used as living snow fences in most parts of the state of Iowa). This design optimization should result in cost-effective solutions to the snow drift problem that can be tailored for weather and road conditions that are the most common for the Iowa environment

**Motion to Approve** by V. Dumdei. 2<sup>nd</sup> by J. Mollering.  
Motion carried with 12 Aye, 0 Nay

**PROPOSAL Additional Funding for TR-619 Development of Self-Cleaning Box Culvert Design - Phase II, Marian Muste, University of Iowa/IIHR (additional \$48,630)**

This proposal is a request for additional funding for the project for the evaluation of the self-cleaning retrofit that Iowa DOT will be constructing on the IA-1 site.

**BACKGROUND**

In general, current knowledge on sedimentation processes at culverts is limited and the literature on this topic is scarce. To date, there is no systematic research regarding the mechanics of sediment transport through multi-box culverts or the sediment deposition impact on the flow through culverts. While is accepted that the sediment transport through culverts is strongly influenced by the nature of the local geological conditions and the soils in the drainage area adjacent to the culvert there are many gaps in our knowledge about the flow at multi-barrel culverts. The limitations in our knowledge are due both to the lack of focus on this subject so far, as well as the complexity of the flow carrying sediment through multi-barrel culverts. The complexity of the flow hampers setting precise modeling conditions for the laboratory and numerical investigations as it entails a series of aspects that require special attention.

**OBJECTIVES**

The overall objective of this project is to identify and/or develop methods for constructing, or retrofitting, box culverts so that the typical flow through a culvert will clean the culvert's entrance area and the barrels and keep the structure performing well with little or no maintenance. The new phase of the study will include, but not be limited to, preparing the implementation phase for the self-cleaning design at the selected site in Iowa. Phase II of the Development of Self Cleaning Culvert Box Culvert Design project entails the following objectives:

1. Monitoring the three-box culvert selected for testing (located on Hwy 1 in Iowa City) for establishing reference condition for assessing the efficacy of the self-cleaning designs and the role of vegetation in triggering and developing sedimentation
2. Prepare the design specifications for implementation of the self-cleaning design
3. Conduct laboratory study to test potential modifications required by the established design
4. Monitor the self-cleaning culvert after implementation.

**Motion to Approve** by W. Weiss. 2<sup>nd</sup> by A. Abu-Hawash.  
Motion carried with 12 Aye, 0 Nay, 0 Abstaining

## **DISCUSSION *Matching Funds for Proposals to Minnesota Local Roads Research Board***

The Iowa Highway Research Board recommended funding for 30 % of the cost of two Minnesota Local Roads Research Board projects at the February 2012 meeting. This funding was contingent upon both LRRB projects proceeding simultaneously. Subsequently, due to funding issues, only *Development and Integration of Advanced Timber Bridge Inspection Techniques for NBIS* was funded. The other project, *Development of Cost-Effective Timber Bridge Repair Techniques for Minnesota* was postponed for consideration in next year's funding. The Board reconsidered the stipulation regarding both projects proceeding together.

**\*\***The board decided to move forward with funding project *Development and Integration of Advanced Timber Bridge Inspection Techniques for NBIS* (\$199,786) at 30%, with approval to fund *Development of Cost-Effective Timber Bridge Repair Techniques for Minnesota* at a later date, when MnDOT has the funding to proceed.

**Motion to Approve** by A. Abu-Hawash. 2<sup>nd</sup> by W. Weiss.  
Motion carried with 11 Aye, 0 Nay, 1 Abstention (W. Klaiber)

## **PROPOSAL *Development of Bridge Maintenance, Inspection and Rating Manuals for Iowa, HDR Consultants*, (\$28,833)**

**OBJECTIVE:** The Bridge Maintenance and Inspection Unit is responsible for providing guidance to bridge inspectors, load raters, and maintenance personnel throughout the state. To do this in a consistent and uniform way, it is intended to create manuals that describe the common practices for these areas. The manuals would be available to anyone working for a state or local agency as reference material to assist them in performing the work assigned.

It is anticipated that this effort would be developed in a phased approach. The first phase of the effort, as outlined below, would be to gather existing information, including current OBS procedures and policies, research similar manuals that have been developed by other DOT's, mutually determine a preferred content with OBS and develop an initial outline for each manual. The second phase, which is not included in this fee estimate, would incorporate the actual writing, development of figures and incorporation of figures and photographs into the individual manual. The second phase would also develop assignments for links to the SliMS program, although actual programming of the links would be performed by InpectTech, the developers of the SliMS software.

**Motion to Approve** by W. Weiss. 2<sup>nd</sup> by E. Steffensmeier.  
Motion carried with 12 Aye, 0 Nay 0 Abstain

## **FINAL RFPs for FY 12**

***\*Updating Guidance Information for New County Engineers (1994 resource guide)***

The Iowa County Engineer's Association Service Bureau is willing to assemble and distribute an updated County Engineering Resource Guide as a part of their ongoing duties, requiring no extra funding. It was determined that there was limited benefit of conducting "overview of practice" type surveys, as they are only current for a short time and people usually want the latest information when a need arises to find out how others are dealing with a particular issue. The Service Bureau, to some extent, reduces the need for an outside effort, since it enables the engineers to draw upon each other's knowledge on-the-fly. This project will not be pursued at this time

***\* Evaluation of Epoxy Patching Materials for Concrete Pavement***

The National Concrete Pavement Technology Center recently published a *Guide for Partial-Depth Repair of Concrete Pavements*. This guide covers most of what was outlined in the original problem statement. A task force of Iowa DOT maintenance personnel and local representatives will review the document and determine the need for further work.

**Voting for FY2012-2013 Project Topic Prioritization**

Prior to voting, there was an opportunity for individuals to show support and explain the need or significance of a particular project. Each regular Board member, or their alternate in their place, received 20 votes to be placed on the various topics of interest. We used the preliminary ranking to determine the order of the projects for voting. Up to a maximum of 4 votes could be placed on any one topic by a voter to weight its importance. After each voter placed all 20 of their votes, the totals were tallied and the projects ranked.

A spreadsheet detailing the final ranking of the proposed projects can be obtained from Mark Dunn.

***NEW BUSINESS--None***

***ADJOURN***

Motion to Adjourn by B. Younie. 2<sup>nd</sup> by K. Mayberry.

Motion carried with 12 aye, 0 nay, 0 abstaining.

**The next meeting of the Iowa Highway Research Board will be held Friday, June 1, 2012, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin at 9 a.m.**



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**Mark J. Dunn, IHRB Secretary**